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Using The Public Switched Voice Network For Analog Data Transmission

Many people are still encountering noise when connecting to computers at the University of Toronto by 1200 or 2400 baud dial-in lines. In the April issue of *ComputerNews*, we told you about some of the actions undertaken to resolve this problem. In May, Mr. Al Heyworth, the University's Coordinator of Telecommunications and Computer Networks, issued the following statement.

Over the past year there has been growing dissatisfaction with the performance of the public switched telephone network as a vehicle for analog data transmission. Bell Canada was asked to report on the nature of the problem, and to take corrective actions, after it became apparent that the problem was associated with the network rather than with a collection of isolated cases of equipment malfunction or individual noisy lines.

In an attempt to reduce the impact of this problem, Bell Canada has cooperated in replacing network-interface equipment and in altering the source of the signals used to clock our CENTREX-III switch. Results were mixed, so, at our insistence, Bell Canada installed a number of lines from a different central switch; this enabled us to determine that the problem is generic. At this point it is clear that there are no simple solutions to the problems that beset the network.

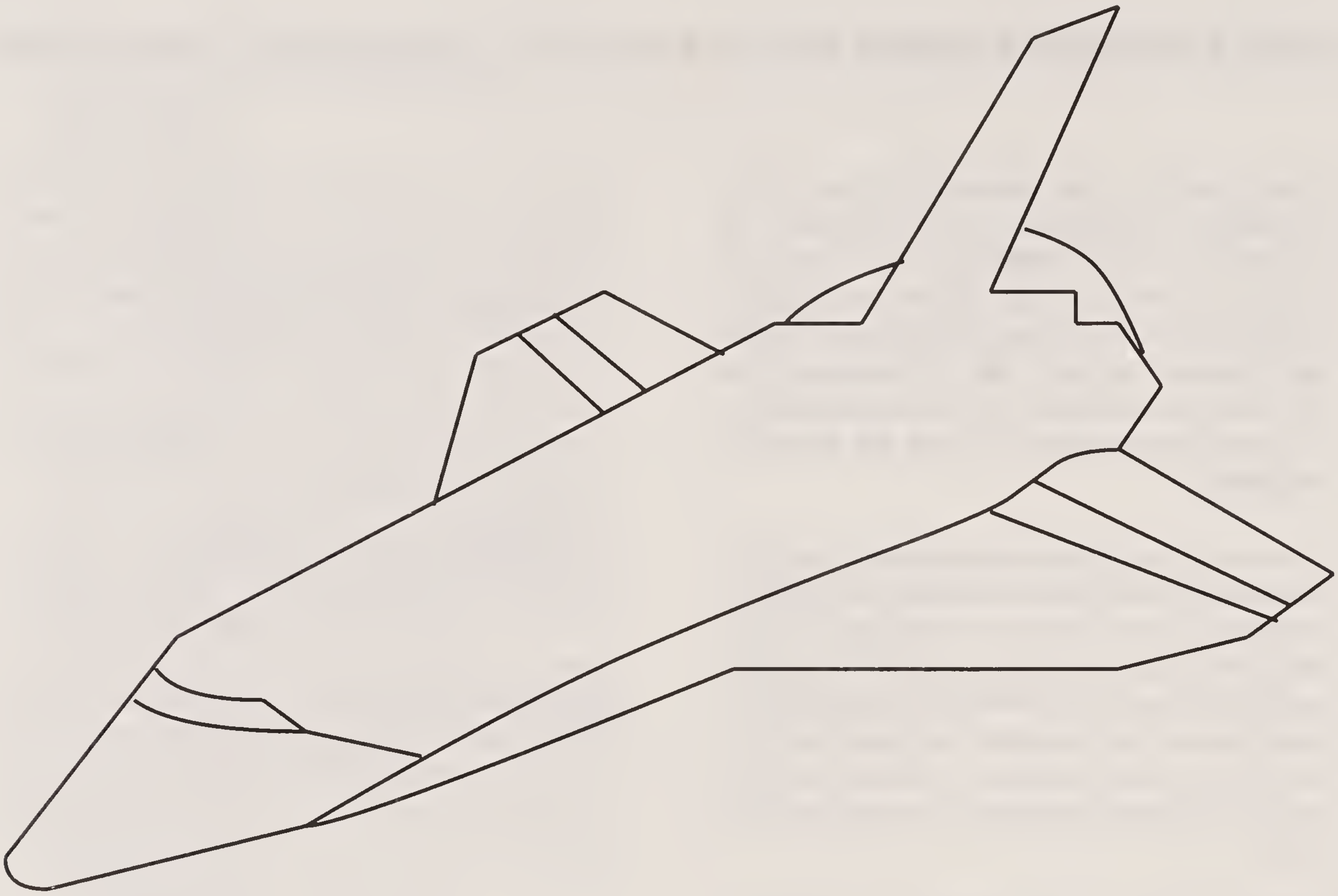
As far as we can determine, the problem stems from the conversion of common carrier networks from analog to digital transmission. Most of the system is in a hybrid state: conversions from analog to digital, and digital to analog, can occur at a number of points in the network. Although these conversions, and the digital transmission links that connect nodes of these networks, are reasonably transparent to voice transmission, they may have significant impact on data transmissions. Since the specifications for a voice channel remain unchanged within a digital network, we cannot accept any suggestion that the use of conventional analog modem techniques should be seriously impacted by this digital transition.

CENTREX-III services, more properly called Business Services, are software-supported features provided by a digital telephone switch. The decision to move to CENTREX-III services is not the source of the problem. Instead, these difficulties occur with connections made through the telephone network from off-campus, and institutions that have purchased their own campus switches report similar difficulty in using the public switched network for analog data transmission.

Bell Canada's continued cooperation will be sought in uncovering the source of these problems and in providing alternative communications paths that may improve the situation in the short term.

UTCS realizes that many of you have been frustrated by the noise on dial-in lines. The problem has affected many departments throughout the University. We hope to continue working with Bell Telephone to find an acceptable solution.

UTCS can best attend to your problems with noisy dial-in lines if you report these immediately. To report a problem, please contact Jon Alexander at 978-6230.



Manpower -- Expensive Hardware

In March, I attended SHARE, a large conference for users of IBM mainframe computers. Approximately 5700 people attended this meeting of computer professionals to discuss everything from the architecture of computer hardware to the design of user documentation.

One of the seminars I attended dealt with designing large software systems (Software Engineering). The speaker was Jack Clemons, an employee of IBM and former senior manager of software development for onboard computer systems for NASA's Space Shuttle programme.

Mr. Clemons had some interesting comments about the cost of developing computer programs, comments that apply to the individual computer programmer as well as to the systems that keep the Orbiter flying. He also dealt with the issue of accuracy in programming code.

Software Development Costs

Mr. Clemons concentrated on the cost of developing large software systems but added that his remarks were equally pertinent to the individual developing a FORTRAN program on a PC. The major component of the budget for either application is manpower.

He made the point that NASA's Space Shuttle Onboard Computer System was an excellent, virtually error-free system that has never caused an in-flight problem or delay. But he also mentioned that the computer system was an example of uneconomical software engineering. To get it virtually error free, NASA spent a pretty packet. As he put it, ''Basically, we had an unlimited budget, and we exceeded it!'' At first, that quote may seem humorous, but after some thought, you realize that error-free computer software does not come cheaply.

Our speaker told us that most major software systems, such as computer-assisted attack sys-

continued...

Manpower -- Expensive Hardware continued

tems for modern fighter bombers, have a long service lifetime, usually 10-30 years. Therefore, it is important to get the computer code correct the *first* time or very early in the development cycle. As development of a system progresses, it becomes increasingly more expensive to correct errors. Remember, the expensive part of development is the human being behind the keyboard.

A typical development cycle is design, coding, testing, field testing, field acceptance, discovery of system errors in the field, and return to the design stage to correct the error. An error in any one of the stages results in a return to the design stage. The later an error is detected, the more it affects the rest of the system and the output of the system. You can imagine the consequences of an undetected error in the Shuttle's reentry program!

If you create a program and make an error, what will happen if the error is not caught early? What will happen if further programs are built on this foundation? How will you know when the error was made?

The consensus is that the cost of correcting the error probably increases by an order of magnitude at each stage of program development. In other words, it is over 100 times more expensive to catch an error in the field-testing stage than in the design and coding stages. This is simply because of the greater number of resources involved at the later stage of development, and the possibility that a larger part of the system is affected by any one error.

So, it is cheaper to put a lot of effort into the design, coding, and early testing stages of development. Time spent here will save a lot of time and possibly grief later in the process. It is clear that, over the long run, software maintenance costs swamp development costs.

These ideas about creating software systems apply also to relatively small computer programs that are developed here at the University of Toronto. If you take more care and time at the early stages of writing your programs, you should have fewer problems later.

Accuracy of Programming Code

How accurate can programmers be? According to Mr. Clemons, the United States Air Force estimated that there are 3-5 defects per 1000 lines of code delivered for field operations. These are only the software gremlins that are detected!

He said that the Shuttle computer system, with its huge budget and long development period, managed to get the error rate down to about 0.2 defects/1000 lines. NASA had to put a near superhuman effort into correcting their software, because a glitch in the software while the shuttle is flying causes a little more excitement than an air-to-air missile going astray.

The speaker concluded that true error-free code is almost impossible in large systems and is much too costly for industry to attain. After all, the Shuttle had an immense budget, but it still was not perfect.

Have a look at one of your old programs. I will bet that if the program contains more than about 400 lines of code, you will find at least a small error in it somewhere.

The lesson that we at the University of Toronto can learn from this is simple: the more time and care you take in the beginning stages of any computer project, the less time you will spend fixing it later.

How much is your time worth to you?

Steve Younker
YOUNKER at UTORONTO

Model	**8530**	**8550**	**8560**	**8580**
Code Name	*Palace*	*Trailboss*	*Roughride*	*Wrangler*
Available Configurations[1,2]	002/021	021	041/071	041/071/111
Availability	now	now	now/Q2	July/July/Q4
Price[3,4]	$2595/3495	$5495	$8245/$9795	$10895/$13195/$17095
Coprocessor Price (optional)	$485	$815	$815	$1235/$1235/$1860
Typical Configuration[5]	$4300	$6400	$10,000	$17,000
Similiar Configuration	PC-XT is $7000	XT286 is $10000	PC-AT is $13000	--
Same *power* as	PC-AT	1.2×XT286	2×PC-AT	IBM 370 168
System Board				
Processor Chip	8086	80286	80286	80386
Clock Rate (MHz)	8	10	10	16/16/20
Wait States	0	1	1	1
Graphics Adapter	MCGA	VGA	VGA	VGA
Coprocessor (optional)	8087	80287	80287	80387[6]
Bus				
Micro Channel®	no	yes	yes	yes
Data Path (bits)	16[7]	16	16	32
Maximum Transfer Rate (MBs)		8	8	21
Typical Transfer Rate (MBs)		6	6	8
Concurrent DMA Channels		4	4	8
Slots[8]	3 PC style	4(16-bit)	8(16-bit)	5(16-bit) 3(32-bit)
RAM Memory				
Standard (MB)	.640	1	1	1/2/2
Maximum (MB)	2	7	15	16
Access Time (ns)		150	150	80
Physical				
Stands on	desk	desk	floor	floor
Dimensions W×D×H (mm)	406×397×102	360×420×140	166×482×597	165×482×597
Weight (kg)	8	9.55	21.3	23.6
Heat Dissipation (BTU/hr)	341	494	1240	1245
Power Supply (watts)		94	207	207
Fixed Disk (internal)				
Auto-Head Parking	no	no	yes	yes
Standard Capacity (MB)	-/20	20	44/70	44/70/115
Maximum Capacity (MB)	-/20	20	88/185	88/185/230
Interleave ratio	1:1	1:1	1:1	1:1
ESDI	no	no	no/yes	no/yes/yes
Average Access Time (ms)	-/80	80	40/30	40/30/28
Transfer Rate (Mbps)	-/5	5	5/10	5/10/10
Diskette				
Standard Size (inches)	3.5	3.5	3.5	3.5
Capacity per diskette (MB)	.720	1.44	1.44	1.44
Provided Spindles	2/1	1	1	1
Maximum Spindles	2/1	2	2	2

[1] Configuration-dependent options further down in table are separated by slashes.

[2] The first two digits of the configuration indicate the size of fixed disk. The last gives the number of diskette drives.

[3] Includes graphics adapter. Does not include display, optional RAM, or optional coprocessor.

[4] Volume discount, educational allowance, or dealer discounts not considered.

[5] An example of a typical configuration is an 8530-021 with a $900 display.

[6] The 8580-041 and 8580-071 use the 16MHz 80387 while the 8580-111 uses the 20MHz 80387.

[7] The 8530 uses a 16-bit path for ROM and RAM and an 8-bit path for I/O and DMA transfers.

[8] The 8530 has a built-in disk controller. Other models use one 16-bit slot.

Table 1. Personal System/2® at a Glance

New Personal Computers

With much fanfare and elaborate staging, IBM unveiled the new IBM Personal System/2® family of computers at Toronto's Constellation Hotel on April 2.

The Personal System/2 family consists of four models in eight configurations. Although all were on display at the unveiling, not all will be immediately available. In fact, UTCS has thus far been able to try out only one of the models. Most of the information presented below comes from an IBM seminar.

As can be seen by the technical summary in *Table 1*, the PS/2 line spans a range of computing power and purchase prices. The smallest in the line, the Model 30, is an XT update about twice as fast as the XT. In fact, the Model 30 has almost the speed of the more expensive IBM PC-AT.

The most powerful computer in the line is the Model 80, configuration 111. IBM claims that this machine is comparable to the IBM 370/168, the top-of-line IBM mainframe a few years ago, which cost millions of dollars. This machine is many times more powerful than the XT. Two megabytes (MB) of memory is standard, and up to 16MB can be installed in 1MB increments. (Remember when 64 kilobytes (KB) was considered plenty?)

In mid-range of the PS/2 series are the Model 50 and the Model 60, which have about twice the power of an AT.

Operating Systems

Although all models of the PS/2 family will run the familiar PC-DOS (Version 3.3 was recently announced) a more advanced operating system (Operating System/2) is also being developed. This new system will not be available for some time, with only a prerelease version coming out sometime next year. OS/2 will run on the Model 50, 60, and 80, but not on the Model 30. (PC-DOS 3.3 and OS/2 are discussed in separate articles in this issue of *ComputerNews*.) IBM also announced that it intends to make available someday a subset of AIX. AIX is an operating system descended from UNIX and is already available on the IBM PC-RT. For a summary of Operating System support, see *Table 2*.

Machine	PC-DOS 3.3	OS/2	AIX
PC	yes	no	no
PC-XT	yes	no	no
PC-XT286	yes	yes	no
PC-AT	yes	yes	no
PS/2 Model 30	yes	no	no
PS/2 Model 50	yes	yes	no
PS/2 Model 60	yes	yes	no
PS/2 Model 80	yes	yes	yes

Table 2. Operating System Support

Components

Whereas the IBM PC, XT, and AT use standard, off-the-shelf components, the new PS/2 machines incorporate 80% IBM-designed parts. This may make it more difficult for competitors to "clone" and sell lower-priced versions of the PS/2, as is currently done with the PC line.

The PS/2 machines are assembled differently from the PCs, featuring parts that snap into place. Also gone are the setup switches telling the system which components are present. This makes it easier for the owner to add extra components or replace old ones.

Bus Design

Another difference between the PC and the PS/2 line concerns the bus design. The bus of a computer is the path used to send data between its various components, such as from the CPU to RAM. The PS/2 machines, all except the Model 30, feature the Micro Channel® bus. The Micro Channel increases speed by enlarging the data paths to 16/32 bits (like adding more lanes to a highway). Thus, more data can be moved around in the same amount of time. The Micro Channel has improved interrupt handling to allow concurrent highspeed I/O operations. The architecture also provides for multiple processors to have equal access to the bus. For example, a

continued...

New Personal Computers continued

processor in a network-accessing card can write data to disk while the main processor reads data from RAM.

One drawback of the Micro Channel bus design is that it is not compatible with that of the PC. This means that the Models 50, 60, and 80 cannot accept the same expansion cards used with the PC, XT, or AT. The PS/2 Model 30, however, does not have a Micro Channel and hence will accept these cards in its three expansion slots.

Graphics Adapters

When you buy a PC, XT, AT, or one of their clones, you also need to buy a display or graphics adapter. Typically, you will get a Monochrome Printer Display Adapter (MPA), a Colour Graphics Adapter (CGA), or an Extended Graphics Adapter (EGA). Non-IBM graphics adapters, such as the Hercules Monochrome Card, are also quite popular. All of these cards are necessary with the PC family in order to drive the display screen. With the PS/2 family of machines, however, IBM has included the graphics adapter on the system board. Thus, you no longer have to buy this additional board, nor do you have to engage an expansion slot for it.

The graphics adapter included with the Model 30 is called the Multi-Colour Graphics Array (MCGA) and is an enhancement to the CGA. The MCGA is software-compatible with the older CGA. The new modes supported by the MCGA allow for graphics of 320 x 200 points in 256 colours or 640 x 480 points in 2 colours, producing graphics with startling colours as compared to the older PC displays. If you are using a monochrome display with a colour application, the MCGA will automatically use up to 64 shades of gray instead. The graphics adapter in the Models 50, 60, and 80 is called the Video Graphics Array (VGA), an enrichment of the EGA. The VGA is software upward compatible with the MPA, CGA, MCGA, and EGA. In addition to supporting the modes of these cards, the VGA introduces two new modes, a graphics mode of 640 x 480 points in 16 colours, and a text mode of 25 rows x 80 columns that uses characters made up of 9 x 16 points. Colours in the new graphics adapters are chosen from a palette of 262,144 colours or 64 gray tones; depending on the mode, you can choose up to 256 colours out of the available 262,144 to appear simultaneously on the screen. For those who require more than the MCGA or VGA have to offer, an optional Display Adapter features a graphics mode of 1024 x 768 points in up to 256 colours.

The new VGA and MCGA will not work with the monitor on your PC, XT, AT, or clone. IBM has announced a new line of monitors for use with the PS/2 family. Also announced was a VGA Expansion Card to permit use of the new monitors and the new graphics modes on the PC, XT, and AT. The Expansion Card can also be used with the PS/2 Model 30.

ROM

Included on the system board of a PC-family machine or compatible is the factory-written Read Only Memory (ROM). On the ROM are various programs, including one that does the automatic power-on self test of system components, and the BIOS, a collection of routines to simplify access to hardware by PC-DOS and other programs. IBM's personal computers also have the BASIC language in ROM, whereas clones generally do not.

The ROM in the PS/2 family of machines also contains the power-on self test program, the BIOS, and BASIC. However, in the Models 50, 60, and 80, there are two additional features. The first is an optional power-on password. If the correct password is not given, the machine is unusable. The second is an enhancement to the BIOS. On the Models 50, 60, and 80, the BIOS comes in two parts, the CBIOS (Compatibility BIOS) and the new ABIOS (Advanced BIOS). The CBIOS is used by software running in "real" mode. PC-DOS and most current software available for the PCs or compatibles run in real mode. The ABIOS is used in "protected" mode, which is available only on the Models 50, 60, and 80. The new OS/2 system will run extensively in protected mode. (Microsoft XENIX is an example of a currently available system that runs in protected mode.) The ABIOS provides dynamic switching between real and protected modes. The ABIOS also sup-

continued...

New Personal Computers continued

ports multitasking operating systems, as well as support for memory addressability up to 16MB.

Disks

The PS/2 line uses 3.5-inch diskettes, the kind used in the Apple Macintosh and IBM's PC Convertible. The Model 30, like the PC Convertible, formats diskettes to hold 720KB of data. The Models 50, 60, and 80 format diskettes to hold 1.44MB of data; however, they can also format for 720KB for transfer to a machine with a 720KB-capacity drive.

The PS/2 family of machines introduces a wider range of fixed disks, from 20MB to 115MB in size. Disk access times are given in *Table 1*. Keep in mind that the PS/2 drives are formatted so a track of data can be read in one revolution (technically referred to as a 1:1 interleaf ratio), while the PC-XT needs six revolutions (6:1 ratio), and the PC-AT needs three (3:1 ratio). The larger fixed disks also use a new interface called Enhanced Small Device Interface (ESDI), which supports data transfers of up to 10 megabits per second.

Some Standard Features

Many things are standard on the PS/2 line. One asynchronous 19.2Kbps serial port (addressed as COM1: by PC-DOS) is included on the system board. This can be used to connect to a modem. (UTCS has already tested ProComm on a PS/2 Model 30 and found it satisfactory.) A parallel bidirectional port is also included, and there is even a port to plug in an optional mouse. There is a date and time clock with a "lifetime" battery, which IBM claims will last more than 15 years. This means your computer will know the date and time when it is powered on. The IBM Enhanced Keyboard is also standard with the machines.

This, in a nutshell, is the Personal System/2. The full impact of IBM's new developments may become clearer in a few months. In the meantime, the Microcomputer Support Group and other UTCS Groups will continue to evaluate this new offering.

Alex Nishri
ALEX at UTORONTO

Operating System/2® for IBM Compatibles

IBM PCs, PC-XTs, and compatibles all use an 8088 central processing unit, but in the last few years, more powerful 80286 CPU chips have become available, and are used in the IBM PC-AT and its clones. Recently, an even more powerful 80386 CPU has come on the market. Unfortunately, MS-DOS and PC-DOS are designed for use with the 8088 only, and software for use with these operating systems is similarly restricted to this type of chip. Although both the 80286 and the 80386 have a "real" mode, which does permit software intended for the 8088 to run, the full potential of the newer chips is not utilized this way. Only in "protected" mode, in which 8088 software is not compatible, can the full power of the 80286 and 80386 be realized. Thus owners of a PC-AT, PC-XT286, PS/2 Model 50, PS/2 Model 60, PS/2 Model 80, and their compatibles cannot use the full potential of the machine with MS-DOS and PC-DOS.

In light of this limitation, a new operating system called Operating System/2 was announced on April 2, at the same time that IBM unveiled its new line of PS/2 computers (see preceding article). Developed jointly by IBM and Microsoft, OS/2 will be licensed to IBM and other personal computer manufacturers. These manufacturers will make changes or enhancements to OS/2 to make it work with their equipment. OS/2 will run only on machines using an 80286 or 80386 CPU and will run extensively in protected mode. (OS/2 does not take advantage of the additional functions that an 80386 has over an 80286, but Microsoft has announced that a future version of OS/2 will do so.)

OS/2 will be a single-user, multitasking operating system. Multitasking permits you to run more than one application concurrently. For example, you may use ProComm to do a file transfer of one chapter of a book and at the same

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OS/2 continued

time write the next chapter with WordPerfect, and if you then require access to a database, you could also run dBASE III to retrieve the answer without stopping ProComm or WordPerfect. Such multitasking is accomplished by scheduling each application for short periods of time on the central processor. OS/2 uses priority-based preemptive scheduling, the technique used in many mini and mainframe operating systems. (Although OS/2 is designed to be used by only one user, it is rumoured that it will eventually be enhanced to offer multiuser capabilities.)

The original IBM PC, which became available in August 1981, came with 16 kilobytes (KB) of Random Access Memory (RAM). This was sufficient for the applications available in those days. But today, PC-DOS itself requires more memory just to boot, and more powerful applications, such as large FORTRAN programs, large amounts of data on spreadsheets, or lengthy documents for word processing, require much greater amounts of RAM. The original 8088-based IBM PC design allows only a maximum of 640KB, which, unfortunately, is not always sufficient for such applications.

OS/2 in protected mode can use up to 16 megabytes (MB) of RAM. OS/2 also permits applications to use more memory than the installed RAM by making use of "virtual memory" in a process known as "segment swapping." Application memory is divided into segments, with those segments not currently being referenced written to disk. When a program references a segment, the operating system brings it back to RAM. The total amount of virtual memory available to an application can be up to one gigabyte, depending on the disk space available for swapping. Multitasking applications use different virtual memory, isolating each application to prevent inadvertent alteration by another application.

OS/2 uses the same file structure as PC-DOS, enabling you to run either one on the same machine and to reference the same files. Unfortunately, OS/2 is limited to 32MB for a disk partition, as is PC-DOS. However, this restriction is expected to be removed in a future version.

Users will be able to manage the power of OS/2 in more than one way. Those already familiar with PC-DOS 3.3 will find that OS/2 has many of the same commands and utilities, but OS/2 adds some new commands that permit interaction with multitasking applications and with the larger memory.

In addition to the line interface used with PC-DOS, OS/2 provides a window interface similar to the one offered with the Macintosh operating system. It uses overlapping windows that can be manipulated either from the keyboard or using a mouse. Each running application can have one or more windows. You can control the window size and position, while applications can create or delete windows. A clipboard function lets you move data from one window to another, thus transferring data among applications.

Windows can be scrolled if all the data does not fit. Functions can be performed on each application by pointing at an icon in the window. Some applications may use pull-down menus with commands to select; others may put rapidly changing graphics in the window. Although the content of a window will vary with each application, the interface will be standardized. This should mean that certain familiar aspects of the user interface will be common across most applications.

OS/2 windows are based on those in Microsoft Windows, a popular product for PC-DOS. However, some changes to the format were made in OS/2; most notably, windows are overlapping instead of tiled. These changes will also be implemented in the newly-announced Version 2.0 of Microsoft Windows.

OS/2 permits one of the running tasks to be a special DOS task, so that you can run programs intended for use with PC-DOS under OS/2. These programs are still limited to 640KB of memory, because they run in 8088-compatible real mode. As well, because real mode does not allow for protection from misbehaved programs, other applications running concurrently may not be as safe.

To run OS/2, it is recommended that you have at least 1.5MB of RAM. If you are running a DOS

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OS/2 continued

task, you need at least 2MB. OS/2 distribution diskettes contain about 5MB of files. Additional disk space is required for swap and history files.

IBM has announced that it will ship an early release of OS/2, Version 1.0, in early 1988. This version will lack windowing as well as some graphics functions. The complete OS/2 will become available in Version 1.1, to follow sometime later. OS/2 will cost $475.

With Version 1.1, IBM also intends to offer Extended OS/2 at a price of $1195. It will include a communications manager and a database manager, and will require a minimum of 3MB of RAM. The database manager will provide SQL for definition, update, and retrieval of data, as well as interactive tools for use with databases. Included will be the ability to import and export data to Lotus 1-2-3 or Symphony. Databases will be limited to 255 columns and rows of 4005 bytes (32,700 bytes for strings). Maximum database size will be limited only by the current maximum disk partition size of 32MB. The communications manager will support concurrent communications using asynchronous or SNA protocols. It will support connections over asynchronous, token-ring, PC Network, X.25, SDLC, and DFT links. It will also support multiple concurrent terminals emulating the IBM 3270, IBM 3101, or the DEC VT100. File transfer using Xmodem and other protocols will also be possible. The recommended minimum amount of RAM for Extended OS/2 is 3MB.

Should you rush out and buy OS/2 when it becomes available? Remember, if your current processor is 8088- or 8086-based, OS/2 will not run on it. In fact, you may not even need the power of OS/2 and the 80286 or 80386 chips. For example, if you use your PC just for occasionally creating simple documents, the expense of an 80286- or 80386-based personal computer and of OS/2 may not be worth it. Not everyone buys a truck; most people find cars more economical and easier to use.

Even if you can justify the expense, you may not want to purchase right away. In the short term, there are unlikely to be many applications that use the additional functions provided by OS/2. Even when they do come out, it may be a good idea to wait until other users find the bugs and problems that inevitably crop up when vendors change applications to fit a new environment.

If you need more information, please phone Advising Services at 978-HELP.

Alex Nishri
ALEX at UTORONTO

New Version of PC-DOS

Microsoft's MS-DOS is arguably the most widely-used operating system, with more than ten million copies in use on IBM personal computers and compatible systems. MS-DOS is licensed to many personal computer manufacturers, including IBM, DEC, Compaq, Wang, Zenith, Tandy, Hewlett-Packard, Olivetti, Siemens, NEC, Apricot, Bull, and Ericsson. These manufacturers provide their own documentation and make changes to MS-DOS to support their hardware. Some manufacturers also add features. IBM's version of MS-DOS is called PC-DOS.

On April 2, Microsoft announced a new version of MS-DOS, Release 3.3. On the same date, IBM announced PC-DOS 3.3. The revisions in the new version of PC-DOS are mostly small. Some bugs in Version 3.2 have been fixed. (UTCS has a list of known bugs in 3.2 and 3.3, for those needing this information.)

PC-DOS 3.3 contains support for the new hardware that IBM has recently developed (see the article entitled "New Personal Computers," elsewhere in this issue). You can now have diskettes with 1.44 megabytes (MB) of data. Fixed disks with over 32MB capacity are supported through partitioning, the process that allows you to break up a disk of over 32MB to create multiple logical disks (for example, a 70MB disk can be partitioned into a 30MB C:

continued...

New Version of PC-DOS continued

drive, a 20MB D: drive, and a 20MB E: drive). Each of the logical disks must still be 32MB or less.

The BACKUP and RESTORE functions of DOS have been enhanced. You can now BACKUP to unformatted disks. By combining small files, BACKUP is now faster with such files. BACKUP also now creates a log file. There are a number of RESTORE enhancements, including a change to prevent you from creating unbootable disks. (Older RESTORE commands will allow you to delete your current system files.)

PC-DOS 3.3 provides a new command called FASTOPEN. As people start to put more files on fixed disks, DOS takes longer to search for them. FASTOPEN is designed to keep a table of up to 999 most recently opened files. Using this table, FASTOPEN allows files that have been accessed recently to be reaccessed more rapidly.

APPEND is a new command that extends the functionality of the existing PATH command, used to tell DOS where to look for the executable files necessary to run a program. For example, when you issue the DISKCOPY DOS command, an executable file called DISKCOPY must be found. APPEND, like PATH, allows the use of files not in the current directory, but it operates with application and data files.

For Batch files, there are a number of enhancements. Batch commands prefixed with an "@" will no longer display on the screen. Thus, "@ECHO OFF" will not produce "ECHO OFF" on the screen.

The new CALL command allows one Batch file to pass control to another Batch file, and then to return control. (An undocumented feature in earlier versions of DOS permits the same thing to be done by typing COMMAND/C SECOND, where SECOND is the second Batch file to be called.)

PC-DOS now provides documention on how to access environmental variables in a Batch file. The technique, widely known but undocumented in previous versions of DOS, allows a Batch file to access variables created with the DOS SET command. For example, if you entered SET DATALIB=4 and then used a Batch file containing the line:

```
echo You have selected  %data libraries%
```

then the line:

```
You have selected 4 data libraries
```

would appear on your screen.

Some tools, formerly supplied with PC-DOS but generally required only by users doing intensive programming, are now available separately. DEBUG, LINK, EXE2BIN, VDISK, and LIB are provided with the Technical Reference, available at an additional cost. DEBUG is also provided with PC-DOS, but without documentation. LIB is a new command allowing a programmer to maintain a library of compiled programs.

PC-DOS 3.3 is available at a cost of $179. You need a minimum of 128KB of RAM on your machine. It will run on the entire line of IBM personal computers, from the PC Jr to the PS/2 Model 80. An upgrade for licensed owners of all previous versions of PC-DOS will be available until the end of 1987 for $99. MS-DOS 3.3 is expected to be available for all sizes of compatible machines.

We suggest that users considering PC-DOS 3.3 look over its new features. Not everyone will need the enhancements provided. UTCS will be evaluating PC-DOS 3.3; if you need assistance in reviewing its features, please phone 978-HELP and ask for an appointment.

Alex Nishri
ALEX at UTORONTO

Media Conversion in the Micro Lab

The saying "You can't get there from here" is often relevant in many fields, including the use of microcomputers. The typical scenario is in three acts:

1. Our protagonist buys a microcomputer and uses it for about a year and a half.
2. Bursting with computer knowledge, s/he buys a newer, more powerful, state-of-the-art micro, selling the old one to a "computerless" friend or associate.
3. Mild panic ensues when s/he is faced with converting files from the old micro to the new. At first, told "You can't get there from here," s/he considers abandoning all the old data, leading to the realization that years of research have been wasted. Finally, coming to his/her senses, s/he calls UTCS for help.

Fortunately, in most cases, you *can* get there from here. At the Micro Lab we routinely transfer files from one disk format to another. Most of the time, it's done quickly and painlessly. Sometimes, it takes a little extra effort. Sometimes, it can only be done off campus, for a fee, but we can tell you where this service is offered. Once in a while, it is next to impossible.

The following media conversion services are currently offered in the Micro Lab at no cost:

- **Apple II <—> IBM PC**: We have a dual-floppy IBM PC with an Apple Turnover board, from Vertex Systems, which allows quick transfer between Apple diskettes and PC- or MS-DOS diskettes. This works for Apple II diskettes in either Apple DOS 3.3 or CP/M; Pro-Dos diskettes must first be converted to DOS 3.3 on an Apple. The Apple Turnover board intercepts signals from the floppy-disk controller to allow a PC floppy drive to read and write Apple-formatted diskettes. Transfer of a full Apple diskette to PC format usually takes about 10 minutes. Transfers from PC to Apple (less common) take a little longer. The most common application at the Lab is converting WordStar files from Apple CP/M to IBM PC; files thus transferred work perfectly well with PC WordStar, without change.
- **Macintosh <—> IBM PC**: Using a networking system called TOPS, from Centram Systems, files can be transferred quickly between Macintoshes and PCs. This perhaps works best for Microsoft Word files, as Word exists in both worlds and translation of formatting codes inside Word documents is reasonably well done. Other PC word-processor files transferred to Macs may require some editing to regain formatting features; however, the text transfers transparently. Pure ASCII text or data files also transfer well. The actual transfer takes about the same amount of time as copying a file on a PC or Macintosh.
- **CP/M <—> IBM PC**: This is done for most single-sided CP/M formats, using a program called Xeno-DISK, which runs on the PC. About 100 CP/M formats are supported. The transfer is reasonably quick, though it often involves some fiddling with the diskettes, such as covering the index hole of the floppy with tape. While arcane, the system usually manages to get the job done. If Xeno-DISK fails, we may use an Osborne 1A to do the transfer, using a program called Media Master, which supports about 20 formats, including IBM single-sided. (Note that all of the CP/M formats are on 5.25-inch media, **not** 8-inch.)
- **Mainframe <—> Micro**: For the PC world, transfers are done using the UTCS version of ProComm, which runs on a PC and uses the Kermit protocol. For Macintoshes, we use Red Ryder, a "shareware" package that runs on the Mac and supports Kermit as well. Our UTCS Apple II Kermit is used occasionally for transfers to Apple IIs. For all of these transfers, we often "mix and match," by transferring in the quickest manner possible (i.e., at the highest baud rate), and then using translation programs to transfer files to the appropriate machine format.

continued...

Microcomputer News continued

- **IBM PC 5.25"<—> IBM PC 3.5"**: We have an IBM PC-XT with a 720 kilobyte (KB) external 3.5-inch disk drive attached. This allows direct use and translation of files between the two disk sizes. This feature is most commonly used by new purchasers of laptops, such as the Toshiba 1100+ and the Zenith 181, both of which have dual 3.5-inch drives. The new IBM Personal System/2 series of micros uses 3.5-inch floppy drives as well. (Models 50, 60, and 80 use 1.44 megabyte (MB) floppies, twice the capacity of our 720KB drive. But, according to IBM, 720KB floppies can be reliably read and written on our drive, and used on the new machines.)

- **Serial transfers**: In some cases, the only way to effect transfers is to connect the two machines in question with a serial cable, start a communications program on each machine, and let it run. This is usually done as a last resort, because it takes longer than the other methods and ties up resources. But if none of the above methods works between two micros, this one often will.

Transferring from **Dedicated Word Processors** to the **IBM PC** or **Macintosh** is something we cannot do in the Lab. However, we can advise you on whom to contact. Commercial firms charge for this service.

Transfers to the IBM PC or Macintosh from other nonstandard machines not mentioned above are usually impossible for us to do in the Lab. Instead, we try to put you in touch with someone on campus who has the same kind of machine as you, and who also has some file-conversion software (such as Media Master or Uniform).

If all else fails, of course, you can always reenter your data. In fact, for some transfers, it would indeed be faster to do that, rather than to go through the file conversion and disk format transfers described above. But such cases are rare.

So please feel free to use our facilities for media conversion. For more information, or to arrange for an appointment to convert files, call Advising Services at 978-HELP. Usually, you *can* get there from here.

Paul Roth
PROTH at UTORONTO

TOPS in the Micro Lab

TOPS is a distributed Local Area Network (LAN) that supports Apple Macintoshes (512K, 512K Extended, Plus, and XL) and IBM PCs (XT and AT) and compatibles. The UTCS Micro Lab has set up a TOPS network of two Apple Macintoshes (one Mac 512K and one Mac Plus) and a Zenith 158 (XT compatible).

The network has been helpful in the Lab. Originally, only the two Macs were connected, each running a separate copy of TOPS (see *Figure 1*). The hard disk in the Mac Plus was "published," a process by which a machine participating in the TOPS network informs other machines about files available for access across the network. This is done through TOPS using the OPEN or MOUNT commands. Publishing the hard disk was particularly useful for us since various applications could then be accessed by users on the Mac 512K. This meant that there was no need to use diskettes on the Mac 512K (although a copy of the software still had to be purchased for each machine wishing to access the application, because software agreements restrict each copy to one machine only).

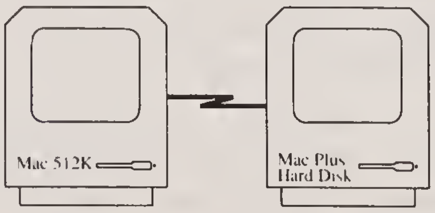

Figure 1

continued...

TOPS in the Micro Lab continued

Then, about a month ago, the hard disk in the Mac Plus seized, and we lost access to all of its files. A few days later when we had access to the disk for a short time, TOPS was used to make a backup of the hard disk onto the Zenith XT's hard disk (see *Figure 2*). This way, all files on the Mac Plus hard disk were now accessible for use from the PC! Now, to access these files, the directory containing them on the PC was again published through TOPS. Once published, as in the case of the two Macs, all machines on the network could once again access this volume.

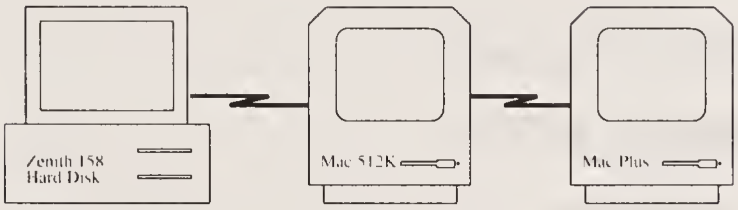

Figure 2

Each machine running TOPS has direct access to every other machine in the network. The network setup also means that if a single machine is nonfunctional, the rest of the network remains intact.

TOPS is easily installed through menu-driven selections. It supports selective publishing of files (with read-write or read-only access), passwords, and record-locking. Files published can be either entire disk volumes or individual files or folders. Like other LANs, it makes resource sharing possible.

According to the vendor, Centram Systems, it is 100% compatible with AppleTalk and with all major hard disks and DOS 2.x or 3.x software applications. It occupies less than 120KB of resident RAM for each machine. TOPS allows up to 32 PCs and Macs to be connected to each AppleTalk network. In addition, up to 65,000 AppleTalk networks can be addressed by TOPS when bridged using Hayes InterBridge or other compatible hardware. The PCs and Macs may be cabled using AppleTalk, PhoneNet, or another compatible cable. The total cable length of the network varies from 1000 feet with AppleTalk cables to 3000 feet with PhoneNet cables.

Access time to open folders and files from other machines is fast. Reviews done by other groups indicate that speed is not significantly sacrificed with greater numbers of active machines on the network.

TOPS preserves the format of files from the originating machine. Thus, files on the Mac will not be "readable" on the PC unless saved as "text only" on the Mac. However, there are some exceptions. For example, Excel can read Lotus 1-2-3 files on the PC, and Lotus 1-2-3 can read Excel WKS files on the Mac. But it is not possible to run Excel on the PC or Lotus 1-2-3 on the Mac, because programs can be run only on the appropriate machines. File listings from the Mac appear in DOS format on the PC. Similarly, file listings on the PC appear with the familiar Mac icons. While experimenting on our network, we determined that up to 12 folders may be individually published on the Mac.

Printing to a LaserWriter on the AppleTalk network is also supported through TOPS from both the Mac and the PC. The Macintosh performs through the usual PRINT command in the FILE menu. The procedure on the PC is quite different. Here, two types of printing are possible: printing to a local serial printer, or to a LaserWriter on the network. Print jobs to the LaserWriter can be sent in either Diablo 630 emulation mode or as PostScript files. This is done using TPRINT. Printing PostScript files created by word-processing packages usually requires that an initialization file be appended to the print file before it is sent to the LaserWriter.

However, another product, TOPS PRINT for the PC (available separately), allows you to change fonts inside a document and select a printer, requires no special procedures, and lets you print as many copies as desired. Printing is done in the background, allowing you to continue with other work. Under TOPS PRINT, up to 32 Macs and PCs can access the same LaserWriter on the network, and up to 32 print jobs may queue at one time.

The cost of TOPS, available at the U of T Computer Shop, is $221 for the Macintosh and $517 for the PC. TOPS for the PC includes the TOPS Interface Card, which must be installed for each

continued...

TOPS in the Micro Lab continued

PC used in the network; each card contains an AppleTalk connector. TOPS on the Mac requires no additional card. The usual AppleTalk network cables are used, so there are no extra cabling costs. TOPS PRINT is available separately at a cost of approximately $275 for each PC in the network.

Overall, TOPS is easy to install, learn, and use, and is fast. We found that sharing programs on the network decreases the maintenance time to install software on separate machines, and increases the amount of work space available on other machines in the network. In addition, applications are more easily accessible. Shared use of a LaserWriter between PCs and Macs is another extremely useful and cost-effective feature. The Lab does not currently have TOPS PRINT, but if we are able to purchase it in the future, access to a LaserWriter could be significantly simplified and improved.

If you have any further inquiries or would like to try the network, please contact Advising Services at 978-HELP.

Alicia Damley
DAMLEY at UTORONTO

The State of Printing at UTCS

Here is a brief update on the current state of printing available at UTCS.

Hardware Devices Available:

UTCS has the following hardware devices:

1 Xerox 8700 Laser Printer (300-dot-per-inch resolution, 70 pages per minute)
1 Apple LaserWriter PostScript laser printer (300 dots per inch, 8 pages per minute)
1 Texas Instruments Omnilaser 2105 PostScript laser printer (300 dots per inch, 15 pages per minute)
1 Allied Linotype Model 100 laser typesetter (1270 dots per inch, 0.3 pages per minute or 3 minutes per page)
1 IBM 1403 impact printer

Access:

Micro users can access the Xerox 8700 Laser Printer, the Apple LaserWriter, or the Linotronic typesetter. To access the Xerox 8700, you must be able to produce a Diablo 630 format file that can be sent to the 8700. To use either the LaserWriter or the Linotronic typesetter, you must be able to produce PostScript code. Please read the next article, ''The State of PostScript at UTCS,'' for more information about this last point.

VM/CMS users can access all of the devices listed above. The Xerox 8700 is capable of printing CMS listings and Scribe pseudotypeset output. The three PostScript devices can print CMS listings and PostScript code produced on CMS (for example, SAS on CMS and WSCRIPT can both produce PostScript for SAS/GRAPH output). The IBM 1403 impact printer can be used to print labels or multipart carbon forms. For more information on accessing these devices on CMS, please see the online Help files for DEST, FORMS, and SENDPS, or contact UTCS Advising Services at 978-HELP.

UNIX users have access to all of the devices listed above. The Xerox 8700 is capable of printing listings. The three PostScript devices can print listings and PostScript code produced on UNIX. A large number of programs on UNIX can produce PostScript code, enabling users to obtain a wide variety of output. To name a few, *troff*, TeX, *plot*, and *enscript* produce PostScript code, and a large variety of utilities convert code intended for other devices to PostScript. For more information, use the command *findman postscript*.

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The State of Printing at UTCS continued

The IBM 1403 impact printer can be used to print labels or multipart carbon forms. Note that users on non-UTCS UNIX machines on the campus network can make arrangements to access the UTCS PostScript devices. Please contact Tom Molnar at 978-8853 for more information.

MVS users (Batch, TSO, or WYLBUR) have access to the Xerox 8700 Laser Printer to print listings and to the IBM 1403 impact printer for labels and multipart carbon forms. We should be able to offer access to the PostScript devices from MVS in the near future.

For general information, please contact UTCS Advising Services at 978-HELP.

Terry Jones
TJ at UTORONTO

The State of PostScript at UTCS

Many people don't really know much about PostScript but have seen output produced by an Apple Macintosh on an Apple LaserWriter. To many, Apple LaserWriter and PostScript are synonymous. Not so. The Apple LaserWriter was the first printer to use PostScript, but a number of other PostScript printers are available today.

A PostScript printer does not have to be used with an Apple Macintosh. It can be used with any computer that can properly transmit PostScript code to it. In the past, only computers that could send data through a serial communications link could talk to a PostScript printer, but now several PostScript printers can be connected to a standard printer port on a micro. Once the connection is made, all you need is some way of producing the PostScript code to send to the printer.

Many mainframe and micro software programs produce PostScript code for any PostScript device.

The Apple Macintosh:

Almost all of the software available for the Apple Macintosh supports PostScript printers. Only some very old programs do not. Be aware that a number of people experience one or all of the following problems the first time they try to print on the Apple LaserWriter or on another PostScript device attached to the Macintosh.

- The first problem stems from having previously been proofing documents on the Imagewriter. The Imagewriter page is larger than the LaserWriter page. Thus, many things, especially drawings designed to fill the page, take two or three pages to print on the LaserWriter, or must be scaled or changed to print properly on one page.

- A second and more complicated issue concerns fonts. The Apple LaserWriter can print four families of fonts beautifully: Times Roman, Helvetica, Courier, and Symbol, with regular, bold, italic, and bold italic available for all except Symbol. Any size or rotation of font is also available. The LaserWriter Plus has 13 font families, but the UTCS PostScript devices have only the four above. If you look at the fonts available on the Mac, you will see some that are not available on the printer (e.g., Geneva, New York). Using these fonts is a common source of printing problems. There are a number of ways to solve these.

  At the time of printing, the Mac can substitute one of the fonts in the printer for the font you have used. However, this can drastically affect the spacing of your text. The widths of the substituted characters will differ, and things will not print as they looked on the screen. Another approach is to change the font used in your document to one of the

continued...

The State of PostScript at UTCS continued

printer fonts. This way, what you see on the screen will closely match what you get on the printer. A third solution is for the Mac to download what is called the ``bitmap'' of any font used that the printer does not already ``know'' about. This results in a very slow print speed and a very ugly output (``chunk'' characters is the best way I can describe them). Another tactic is to teach the LaserWriter a new font. You can get a version of the font you want to use that is designed for the LaserWriter and ``download'' it to the printer before you print.

Fonts are expensive. Choose the best solution for your needs.

- A third problem occurs when people come in to print on the LaserWriter from the Mac without the LaserWriter driver in their system folder. It is easy to tell whether you have the necessary driver by opening up the system folder and looking for the LaserWriter and LaserPrep files. UTCS can assist you in placing those on your disk if you do not have them. Be prepared for this the first time you come in to print. An alternative solution is to have NO system folder on your disk, and to use our system disk instead.

- Many problems encountered by people producing typeset output are the result of overconfidence. People will print a document directly to the typesetter without proofing it on the laser printer first. Many very simple but very expensive and time-consuming mistakes are made this way.

IBM PC:

A number of packages for the IBM PC produce PostScript suitable for UTCS' PostScript devices. These include word-processing software, desktop-publishing software, and graphics packages.

Of the word-processing software that supports PostScript, the packages we have had some experience with are Microsoft Word 3.0, FinalWord II, Nota Bene 2.0, PC Write 2.73, and WordPerfect 4.2. We have produced documents from all of these packages with varying success. FinalWord II was the first we used, and it did a very good job of driving PostScript devices. Microsoft Word also handles things very well. PC Write and Nota Bene are not quite so glamorous as the first two in their handling of PostScript printers, but they do work. WordPerfect 4.2 gave us many problems at first, but we have now produced some reasonable documents using it. One problem with most word-processing packages is that they set margins and other dimensions in terms of characters. This is fine for fixed-width characters but is almost meaningless with the proportionally spaced fonts used on the PostScript devices. Microsoft Word and FinalWord allow margins and such to be specified in inches or centimetres, which makes them quite easy to use even with proportionally spaced fonts.

There are a number of desktop-publishing packages available for the IBM PC family that support PostScript printers. Most of these operate under a windowing environment such as GEM or Windows and access the printers through these environments. Thus, it is really the environment that supports the PostScript device. Output from Ventura Publishing produced on our devices looks very nice.

Some business graphics packages for the IBM PC family will produce graphs on PostScript devices. A couple of these are Microsoft CHART and 35mm Express.

I have a long list of IBM PC software that supports PostScript. The list was compiled nearly a year ago, and no doubt even more packages now offer this support.

Atari:

I had the opportunity recently to see Publishing Partner, an inexpensive desktop-publishing package for the Atari 1040 ST that does support PostScript. It produced some very good results on the laser printers and the typesetter. This setup would be useful for a small organization that needs more than just word processing.

Apple II, Amiga:

At present I am unaware of software for these machines that supports PostScript devices. If you

continued...

The State of PostScript at UTCS continued

are familiar with such a product, please contact me so that I can try to evaluate it.

UNIX:

UNIX is loaded with software that supports PostScript. A number of utilities convert standard text listings, Diablo output, and plot output to PostScript. There are *troff* packages that produce PostScript as well as TeX. Some are Class A support, some are unsupported but available nonetheless. The best source of information on these is the GP UNIX command *findman postscript*.

Users of other UNIX machines on the campus network can access our PostScript devices without an account on the UTCS UNIX machine. We can arrange for users on other machines to send output directly to our printers across the network. Please contact Tom Molnar at 978-8853 for details.

CMS:

Users of CMS can send PostScript code produced by SAS/GRAPH or WSCRIPT to any of the UTCS PostScript devices. Standard listing files can be sent as well. These will be formatted to look like line printer output.

MVS:

We have no access to the PostScript devices from MVS yet, but it is planned for the future.

Terry Jones
TJ at UTORONTO

WATFOR-77 for the PC Available

WATCOM Systems Inc. has released a new version of WATFOR-77 for the IBM PC. WATFOR-77 is the latest in efficient FORTRAN compilers derived from the University of Waterloo's popular WATFIV compiler.

UTCS has a site license for WATFOR-77 that allows us to distribute this powerful FORTRAN compiler to researchers and academics on campus at a very low cost. Academics and researchers can obtain a licensed version of the software for only $35/year. When you renew your software license, UTCS will trade you the latest release from Waterloo in return for the expired version. (Note: Due to the nature of our contract with WATCOM, Scarborough, Erindale, and UTIAS customers must pay $50/year.)

Although WATFOR-77 is not a fast compiler, it compiles and executes in one step, and is thus much more convenient than other FORTRAN compilers that require several passes and several floppy disks.

WATFOR-77 is available in two versions: with the 8087 math coprocessor chip, and without it.

As a bonus, the WATCOM Editor is provided free of charge. This editor is easy to learn and use, good for program writing and output browsing.

WATCOM offers WATCOM GKS, a subset of the International Graphic Kernel Standard. This library of basic graphics subroutines allows you to build your own graphing and plotting programs and is available for only $5/year.

Three manuals may be purchased with the compiler: the *WATFOR-77 User's Guide* (recommended), the *GKS Graphics Tutorial and Reference Manual*, and the *WATCOM Editor User's Guide*.

For more information on WATFOR-77, or to obtain a registration contract, contact Alicia Damley at 978-6628. Contracts can also be picked up at the UTCS Information Office.

Paul Shindman

License Renewal for SAS under PC-DOS

In accordance with UTCS' distribution policy, all users who acquired SAS under PC-DOS from UTCS must renew their license if they wish to continue using SAS/PC. An update diskette for base SAS will be available in early June. This update is required to provide a grace period from July 1 through mid-August until the authorization code for 87-88 arrives from SAS Institute.

Unlike a year ago, there is no new maintenance release of either SAS/base or SAS/STAT at this time. Version 6.03 is expected in the fourth quarter of 1987 and it will be distributed at that time. License holders will also receive SAS/GRAPH and SAS/FSP for the PC later this year. These two products have been announced by SAS Institute for distribution in the fourth quarter of 1987. SAS/IML is currently available, and SAS/ETS and SAS/OR are expected to be released later this year. These will be considered for distribution to all license holders if sufficient interest is expressed. This may require an additional increase in the license fees.

The renewal fee is $125 per installation. However, for the coming year we are charging users only $100, since the new products (SAS/GRAPH and SAS/FSP) are not going to be available until later. The increase over last year will be used to acquire hardware and software to improve support for the growing number of SAS/PC modules and related software. Only partial central funding was approved for this purpose in the 1987-88 budget.

How to get your update diskette:

Users will be contacted by mail with the necessary renewal forms. Alternatively, forms may be picked up at the UTCS Information Office. Completed forms should be returned to Dale Wright in the UTCS Information Office (Room 206, Engineering Annex, Phone: 978-4990).

As with your original license and diskettes, payment for the $100 renewal fee must be made from University or research funds. To do this, contact Dale Wright in the UTCS Information Office. These arrangements may be taken care of when the completed renewal forms are returned, if the person bringing the forms has signing authority. Once payment has been arranged, Dale Wright will distribute the update diskette. There is no additional charge for the diskette.

One more step will be necessary after July 1. SAS Institute includes a timebomb in the SAS/PC software, which makes it unusable a few weeks after the July 1 renewal date. You will need a validation code to reset the timebomb during July. Because of fiscal procedures at both U of T and the SAS Institute, we do not expect to have the code before mid-July. This information will be sent via Campus Mail as soon as possible to all users who have renewed. The user is then responsible for performing the initialization procedure using this validation code.

Obtaining further information:

For technical information about SAS under PC-DOS, to arrange for a demonstration, or for assistance in completing the registration form, please call me at 978-5045.

Dr. Andrzej Pindor
APINDOR at UTORONTO

SPSS-X TABLES Available on CMS

The SPSS-X TABLES procedure is now available on CMS on UTORONTO. It has been installed with both the current version (2.1) and the new version (2.2) of SPSS-X. TABLES is designed with market researchers and their requirements in mind. It extends SPSS-X to produce high-quality tables from system datasets created within SPSS-X. Display of survey results, including multiple-response questions, is an important aspect of the TABLES procedure.

Regular users of SPSS-X should find TABLES a welcome addition. SAS users have had access to a similar procedure, PROC TABULATE, for a number of years. The Statistical & Numerical Analysis Computing (SNAC) Group has compared the two procedures by trying to reproduce the examples in the *SPSS-X Tables* manual with PROC TABULATE. A detailed comparison is given below but, to summarize, the documentation provided with SPSS-X TABLES is much more extensive and provides a better learning environment. Although most of the examples in *SPSS-X Tables* were successfully duplicated in SAS, the syntax of commands was often quite different and not always easy to work out in SAS. Current SAS users can use PROC TABULATE to create quite complex tables, but may wish to consider SPSS-X TABLES for special cases, such as multiple-response questionnaires. SPSS-X users are advised to use TABLES for all their programs. The SNAC Group at UTCS is available for consultation on the use of both procedures.

SPSS-X TABLES is similar in many ways to PROC TABULATE in SAS. Both procedures will:

- Create one-, two-, or three-dimensional tables.
- Place counts and percentages for categorical variables in the table cells.
- Calculate a number of statistics for continuous (analysis) variables.
- Create complex designs by nesting one or more variables within another variable.
- Concatenate two or more subtables along any dimension.
- Calculate row, column, and subtable percentages.
- Calculate row, column, and grand totals.
- Offer choices for labelling and annotating the tables.

SPSS-X TABLES differs from SAS PROC TABULATE in several important ways.

- The syntax of TABLES is oriented towards categorical variables, while PROC TABULATE syntax is oriented towards continuous variables.
- TABLES is more flexible in annotating tables.
- TABLES provides more flexibility in defining the bases for calculating percentages.
- Missing-value handling can be misleading in PROC TABULATE.
- Only TABLES provides a simple way to display multiple-response variables.
- TABLES provides median, mode, and percentile statistics.

A reference guide to SPSS-X TABLES is provided in Section 24 of the *SPSS-X User's Guide, Edition 2*. A tutorial and alternative reference guide is the *SPSS-X Tables* manual. The latter is strongly recommended for users just learning TABLES. Both guides are available for reference at the UTCS Information Office, Room 206, Engineering Annex. Please contact Bill Fehlner at 978-6509, or Advising Services at 978-HELP, for further information on SPSS-X TABLES or SAS PROC TABULATE.

Bill Fehlner
FEHLNER at UTORONTO

Academic IBM Mainframe Services Consolidate

Over the May 1 weekend, UTCS consolidated the Academic MVS and VM machines. Prior to this date, MVS ran on an IBM 4381-R03, supporting a Batch service, TSO, WYLBUR, and APL. VM ran on an IBM 4381-P02 and supported the CMS service.

By examining usage patterns, UTCS saw that there were opportunities to consolidate the two computers. Some unique properties of VM (Virtual Machine) were exploited for this purpose. The Control Program (CP) of VM can make a large computer emulate many identical but less powerful machines called ``virtual machines.'' CP divides the available computer resources among these virtual machines. To the user of the virtual machine it is like having a personal computer, although the resources of a mainframe are actually being used.

A virtual machine can IPL (or ``boot'') any operating system that the mainframe can IPL. Under VM, virtual machines can run MVS, CMS (a single-user operating system with capabilities very similiar to PC-DOS), or VM itself (in effect running VM under VM).

UTCS now runs VM on the IBM 4381-R03. Under VM are many virtual machines running CMS and one running MVS. Thus the CMS, MVS, Batch, WYLBUR, TSO, and APL services are all running together on the IBM 4381-R03.

To ensure that neither MVS-based services nor CMS suffers from the competition for computer resources, UTCS system programmers have given special instructions to CP. As a result, the virtual machine running MVS is given access to approximately half of the mainframe computer, while the other virtual machines, most of which provide CMS services, are given the other half.

Because MVS is running on only half of its former resources, overall throughput will be lower. UTCS system programmers are making adjustments to ensure that interactive CMS, TSO, WYLBUR, and APL response time does not suffer. This is being done at the possible expense of MVS Batch jobs, which may run more slowly. Some initial problems with the consolidation did result in slower interactive response, most notably in WYLBUR, but we believe these problems are now solved.

Alex Nishri
ALEX at UTORONTO

APL Goes Class C

Sharp APL has been in use at the University of Toronto for many years, but for some time now, the mainframe-based APL service has seen decreasing popularity. Although APL has evolved and improved over the years, users have found other solutions to their computing needs. Some departments that relied heavily on APL have switched to using minicomputers, and there are now thousands of microcomputers in offices throughout the campus.

Only a handful of people still use APL actively. Because of the difficulty in maintaining expertise sufficient to support these users, UTCS is planning to lower the support level of APL to Class C. This means that the Advising Office may be unable to help you with an APL question. Also, should APL break, UTCS will not direct resources to fix it until all other products and services are taken care of. Although APL is unlikely to break spontaneously, we are currently considering an upgrade to the MVS system which may adversely affect some APL features.

For more information, please call Advising Services at 978-HELP.

Alex Nishri
ALEX at UTORONTO

UTCS Source Language Processor Maintenance/Upgrade

The normal biyearly UTCS processor maintenance will take place in June. The following changes have been made:

MVS

The current "new" VS FORTRAN, PL/I OPTIMIZER, and VS COBOL source language processors will become the "production" processors. An updated set of "new" processors will be created, with fresh maintenance.

VM/CMS

VS FORTRAN and PL/I OPTIMIZER will undergo the same changes as on MVS, on both the UTORONTO and UTOREPAS machines. WATFOR-77 Version 1.5 has been installed as the "new" WATFOR-77 compiler on the UTORONTO machine.

Please watch HOTNEWS items for further information.

Herb Kugel
KUGEL at UTORONTO

Change Committee

Changes to Academic MVS Services

1. SAS 5.16 was installed on MVS for user test (March 24).
2. A 4245 printer was installed (April 28).
3. MVS is running under VM in a consolidated configuration (April 16).

Changes to Academic VM/CMS Services

1. Rate groups were implemented for VMACCOUNT (March 9). The accounting reports will show actual charges and not just university rates for commercial and affiliated customers.
2. User test of SAS 5.16 commenced on March 10.
3. Kermit Version 3.1 was installed (May 12).
4. MAIL/MAILBOOK commands became Class A product (March 16).
5. HPO was upgraded to Release 4 (March 22).
6. VM was added to the NETMON network (April 24).

Changes to GP UNIX Services

1. Accounting for typesetting was installed (March 16).
2. Typesetting and laser output charges were added to the CHARGES command (March 12). Rate multipliers were added where needed.
3. A charge for I/O operations was implemented (March 15).

Changes to Other Systems and Services

1. Three 1200- and two 2400-baud dial-in line phone numbers have been changed temporarily to isolate Bell problems and give users an alternative route in the event of difficulties (March 18).

Beverly Scarborough
BEVS at UTORONTO

Personnel Changes

After working at UTCS for nine years, **Paul Shindman** has decided to leave and pursue other endeavors. **James Bailey** has also left to pursue other endeavors.

Howard Lem has moved from the Erindale Campus Site to the Engineering Annex Site to become the UTCS Facilities Coordinator. **Elvis Lee-Hon-Siong** has accepted the programmer position at the Erindale Site.

Mandy Spiller, our Waterloo Coop in Publications has finished her work term with us, and has returned to school. **Marika Tamm** has rejoined Publications for her second work term.

UNIVERSITY OF TORONTO COMPUTING SERVICES HOURS OF SERVICE

CANADA DAY (JULY 1)
CIVIC HOLIDAY WEEKEND (August 1, 2, 3)

The hours of service for the above holiday weekends will be announced via system Broadcast and HOTNEWS messages closer to the holiday weekend.

Recent Acquisitions in the Computer Library

AAECC, *Proceedings of 2d(1984) and 3d(1985) conferences.* Berlin, Springer-Verlag, 1986.

Advances in data base theory. Vol. 2. H. Gallaire, J. Minker, J. Nicolas, eds. New York, Plenum Press, 1982.

Aegean Workshop on Computing, Loutraki, Greece, July 1986. *VSLI algorithms and architectures,* ed. by F. Makedon et al. Berlin, Springer-Verlag, 1986.

American Society for Information Science. *Proceedings of the 49th annual meeting.* Chicago, 1986.

Anshel, Michael, ed. *Mathematics of information processing,* ed. by M. Anshel and W. Gewirtz. Providence, R.I., American Mathematical Society, 1986.

Barton, G. Edward, Jr., R.C. Berwick and E.S. Ristad. *Computational complexity and natural language.* Cambridge, Mass., MIT Press, 1987.

Beech, David, ed. *Concepts in user interfaces: a reference model for command and response languages.* Berlin, Springer-Verlag, 1986.

Behaviour and information technology. (new journal subscription)

continued...

Computer Library continued

Beider, John and P. Jackowitz. *Modula-2.* Boston, PWS Publishers, 1986.

Bertin, Jacques. *Semiology of graphics: diagrams, networks, maps.* Madison, University of Wisconsin Press, 1983.

Berwick, Robet Cregar. *The acquisition of syntactic knowledge.* Cambridge, Mass., MIT Press, 1985.

Bibel, Wolfgang and K.P. Jantke, eds. *Mathematical methods of specification and synthesis of software systems '85.* Berlin, Springer-Verlag, 1986.

Book, Ronald V., ed. *Studies in complexity theory.* London, Pitman, 1986.

Bramer, M.A., ed. *Research and development in expert systems III.* Cambridge, University Press, 1987.

Brooks, Rodney Allen. *Programming in common LISP.* New York, Wiley, 1985.

Canadian Association for Information Science. *Computer science and information science: at the crossroads.* Ottawa, CAIS, 1985.

Chu, Wesley W., ed. *Distributed systems.* Dedham, Mass., Artech House, 1986. 2v.

Clinic on Library Applications of Data Processing, University of Illinois, April 1985. *Proceedings.*

Colloquium on Automata, Languages and Programming, 13th, Rennes, France, 1986. *Automata, languages and programming.* Berlin, Springer-Verlag, 1986.

Colloquium on Trees in Algebra and Programming (CAAP). *Proceedings of the 11th(1986) conference.* Berlin, Springer-Verlag, 1986.

Computer Personnel Research Conference. 22nd, Calgary, Oct. 1986. *Proceedings.*

Conference on Algorithms and Hardware for Parallel Processing, Aachen, Sept. 1986. *CONPAR 86 proceedings,* ed. by W. Handler et al. Berlin, Springer-Verlag, 1986.

Conference on Computer-Supported Cooperative Work, Austin, Texas, Dec. 1986. *Proceedings.*

de Bakker, J.W., et al. eds. *Current trends in concurrency: overviews and tutorials.* Berlin, Springer-Verlag, 1986.

Distributed Computing. (new journal subscription)

Ellis, John Rolfe. *Bulldog: a compiler for VLIW architectures.* Cambridge, Mass., MIT Press. 1986.

European Symposium on Programming, Saarbrucken, Germany, March 1986. *Proceedings.* ed. by B. Robinet and R. Wilhelm. Berlin, Springer-Verlag, 1986.

Fall Joint Computer Conference, Dallas, Nov. 1986. *Proceedings.* ed. by H.S. Stone. Washington, D.C., IEEE Computer Society Press, 1986.

Fernstrom, Christer. *LUCAS associative array processor: design, programming, and application studies.* Berlin, Springer-Verlag, 1986.

Ganzinger, Harald and N.D. Jones eds. *Programs as data objects.* Berlin, Springer-Verlag, 1986.

Haugeland, John. *Artificial intelligence: the very idea.* Cambridge, Mass., MIT Press, 1985.

continued...

Computer Library continued

Hausser, Roland. *NEWCAT: parsing natural language using left-associative grammar.* Berlin, Springer-Verlag, 1986.

Hildebrandt, Darlene Myers, ed. *Computing information directory: a comprehensive guide to the computing literature.* Federal Way, Wash., Pedaro Inc., 1986.

Hillis, W. Daniel. *The connection machine.* Cambridge, Mass., MIT Press, 1985.

Hutchins, W. John. *Machine translation: past, present, future.* Chichester, Eng., Ellis Horwood, 1986.

IFIP World Computer Congress. *Information processing 86: proceedings of 10th congress.* Amsterdam, North-Holland, 1986.

IFIP TC-6 International Symposium on Computer Message Systems, 2d, Washington, D.C., Sept. 1985. *Computer message systems,* ed. by R.P. Uhlig. Amsterdam, North-Holland, 1986.

IFIP TC-10 Working Conference on Fifth Generation Computer Architectures, Manchester, U.K., July 1985. *Fifth generation computer architectures,* ed. by J.V. Woods. Amsterdam, North-Holland, 1986.

International Conference on Computer Communication, 8th, Munich, Sept. 1986. *Proceedings.* Amsterdam, North-Holland, 1986.

International Conference on Entity-Relationship Approach, 4th, Chicago, Oct. 1985. *Proceedings.* Silver Spring, Md., IEEE Computer Science Press, 1985.

International Workshop on Distributed Algorithms, 1st, Ottawa, Aug. 1985. *Distributed algorithms on graphs,* ed. by E. Gafni and N. Santoro. Ottawa, Carleton Univ. Press, 1986.

Jensen, Kathleen and N. Wirth. *Pascal user manual and report.* 3d ed. New York, Springer-Verlag, 1985.

Journal of complexity. (new journal subscription)

Kim, Won, et al, ed. *Query processing in database systems.* Berlin, Springer-Verlag, 1985.

Machine learning. (new journal subscription)

The PostScript Language Journal. (new journal subscription)

Rader, Robert J. *Advance software design techniques.* New York, Petrocelli Books, 1978.

RIMS Symposia on Software Science and Engineering, II. *Proceedings 1983 and 1984.* Kyoto, Japan. Berlin, Springer-Verlag, 1986.

Sale, Arthur H.J. *Modula-2: discipline & design.* Sydney, Addison-Wesley, 1986.

Schendel, Udo. *Introduction to numerical methods for parallel computers.* Chichester, Eng., Ellis Horwood, 1984.

Slade, Stephen. *The T programming language: a dialect of LISP.* Englewood Cliffs, N.J., Prentice-Hall, 1987.

Symposium on Mathematical Foundations of Computer Science, 12th, Bratislava, 1986. *Mathematical foundations of computer science.* Berlin, Springer-Verlag, 1986.

Tremblay, Jean-Paul and P.G. Sorenson. *An implementation guide to compiler writing.* New York, McGraw-Hill, 1982.

The Visual computer. (new journal subscription)

Stephanie Johnston

Technical Reports Recently Received in the Computer Library

AT&T Bell Laboratories

Aho, Alfred V. and Sethi, R. *Maintaining cross references in manuscripts.* Sept. 1986.

Bentley, Jon L. et al. *CHEM-A program for typesetting chemical diagrams* (user manual). April, 1986.

Koenig, Andrew. *C traps and pitfalls.* July, 1986.

Koenig, Andrew. *The snocone programming language.* Aug. 1986.

Institute for New Generation Computer Technology. (ICOT)

Enomoto, Hajime et al. *Paradigms of knowledge based software system and its service image.* Nov. 1983.

Furukawa, Koichi et al. *Mandala: A concurrent prolog based knowledge programming language/system.* Nov. 1983.

Sakai, Ko and Taizo, M. *Incorporating naive negation into prolog.* Oct. 1983.

Yokota, Haruo et al. *An enhanced inference mechanism for generating relational algebra queries* (extended abstract). Oct. 1983.

Stanford University. Center for the Study of Language and Information

Johnson, Mark. *Computer aids for comparative dictionaries.* Aug. 1986.

Link, Godehard. *Generalized quantifiers and plurals.* Dec. 1986.

Uszkoreit, Hans. *Categorical unification grammars.* Dec. 1986.

Wang Institute of Graduate Studies

Bernstein, Philip A. *Database system support for software engineering -- An extended abstract.* Feb. 1987.

McKeeman, W.M et al. *C grammars.* Feb. 1987.

Perlman, Gary. *STAT: Data manipulation and analysis programs for MS-DOS and UNIX.* A tutorial overview of release 5.3. Feb. 1987.

Stephanie Johnston

[Note: This will be the last issue in which *Recent Acquisitions in the Computer Library* and *Technical Reports Recently Received in the Computer Library* will be printed. These lists will be distributed in the newsgroup ut.general. A List is also posted on the Computer Library bulletin board.

Documents at UTCS

All vendor-produced documentation may be ordered through the UTCS Information Office, Room 206, Engineering Annex. UTCS documents and selected vendor documents are also stocked there for purchase. For more information on prices, call Dale Wright at 978-4990. Whenever feasible, documents are made available online, and users are encouraged to print their own copies. On the MVS and VM machines, special commands have been provided for this purpose.

To print online documents on:

IBM MVS	**IBM VM/CMS**	**GP UNIX**
WYLBUR users type "do document?"	type "help document"	use *ipr* command
TSO users type "help document"		
APL users type ")LOAD 1 UTCSGUIDE<RETURN>HELP"		

See examples at the end of next page.

UTCS Documents in hardcopy

New:

Previously announced:

Academic's Guide to Microcomputer Systems
Character Sets for Highspeed Printing
UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction
UTCS GUIDE TO PRODUCTS AND SERVICES: Basics
UTCS GUIDE TO PRODUCTS AND SERVICES: Accounting
UTCS Catalogue: Access, Part 1
UTCS Catalogue: Access, Part 2
UTCS Catalogue: IBM MVS Utilities
UTCS Catalogue: Numerical Products
UTCS Catalogue: Statistics Products
UTCS Catalogue: Text Products
UTCS Guide to Census Tapes
UTCS Guide to Tape Usage on VM/CMS
UTCS Guide to Kermit
UTCS Guide to Micro File Transfer Service
UTCS Guide to Text Processing on GP UNIX

UTCS Documents online	**MVS MANUAL**	**CMS LISTING**	**GP UNIX**	**Forms Code**
New:				
Previously announced:				
UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction	INTRO	INTRO	/usr/doc/utcs/intro	*
UTCS GUIDE TO PRODUCTS AND SERVICES: Basics	BASICS	BASICS	/usr/doc/utcs/basics	*
UTCS Catalogue: Access, Part 1	ACCESS1	ACCESS1	/usr/doc/utcs/access1	*
UTCS Catalogue: Access, Part 2	ACCESS2		/usr/doc/utcs/access2	*
UTCS Catalogue: IBM MVS Utilities	MVSUTIL	MVSUTIL		*
Product-Function List	UTILLIST	UTILLIST		BXQD
UTCS Catalogue: Numerical Products	NUMCAT	NUMCAT		*
Product-Function List	NUMLIST	NUMLIST		BXQD
UTCS Catalogue: Statistics Products	STATCAT	STATCAT		*
Product-Function List	STATLIST	STATLIST		BXQD
UTCS Catalogue: Text Products	TEXTCAT	TEXTCAT	/usr/doc/utcs/textcat	*
UTCS Guide to BMDP	BMDP	BMDP		*
UTCS Guide to Census Tapes	CENSUS	CENSUS	/usr/doc/utcs/census	*
UTCS Guide to GP UNIX			/usr/doc/utcs/gpunix	*
UTCS Guide to GPJS	GPJSX	GPJSX	/usr/doc/utcs/gpjs	*
UTCS Guide to Highspeed Printing	PRINT	PRINT	/usr/doc/utcs/print	*
UTCS Guide to IBM MVS Online Storage	IBMDISK	IBMDISK		*
UTCS Guide to Kermit	KERMIT	KERMIT	/usr/doc/utcs/kermit	*
UTCS Guide to Micro File Transfer Service	MICROXFR	MICROXFR		*
UTCS Guide to Micro Laser Printing	MICRLASR	MICRLASR		*
UTCS Guide to SAS	SAS	SAS		*
UTCS Guide to SCRIBE		SCRIBE		*
(For printing instructions, see page 1 of document)				

** Recommended forms code for the 8700 is YXLE unless otherwise stated.*
‡ Use the 87SET command. Type "help 87set".

Documents at UTCS continued

UTCS Documents online	MVS MANUAL	CMS LISTING	GP UNIX	Forms Code
UTCS Guide to Series/1 Terminal Use	SERIES	SERIES		*
3270 Emulation:				
Cybernex APL100 and Volker Craig VC404	CYBER	CYBER		*
DM1520	DM1520	DM1520		*
Hardcopy Terminal	HARDCOPY	HARDCOPY		*
IBM 3101	IBM3101	IBM3101		*
IBM PC Kermit	PCKERMIT	PCKERMIT		*
SOROC IQ	SOROC	SOROC		*
VT52	VT52	VT52		*
VT100	VT100	VT100		*
UTCS Guide to SPSS	SPSS	SPSS		*
UTCS Guide to SUBUTILS	SUBUTILS	SUBUTILS		*
UTCS Guide to Tape Usage on VM/CMS		CMSTAPE		*
UTCS Guide to Text Processing on GP UNIX			/usr/doc/utcs/text	*
UTCS Guide to TFW.MAK in SCRIBE		TFWMAK		*
UTCS Guide to TSO	TSOGD			*
UTCS Guide to UTDSUTIL	UTDSUTIL	UTDSUTIL		*
UTCS Guide to VM/CMS	CMSGD	CMSGD		*
UTCS Guide to WYLBUR	WYLINTRO			*
UTCS Rate Schedule (Commercial)		RATESCOM		‡
UTCS Rate Schedule (External)		RATESEXT		‡
UTCS Rate Schedule (Internal)		RATESINT		‡
UTCS WYLBUR Tutorial	WYLTUTOR			*
Other Documentation online				
CLSC Documents				
CLSC Guide to Computing on the CRAY from the VM/CMS Front End		CRAYGD		*
Kermit				
Kermit Protocol Manual	KERMITPM	KERMITPM		YXOE
Kermit User Guide	KERMITUG	KERMITUG		YXOF
VM Tape Documents				
TapeMap User's Guide and Reference		TAPEMAP		*
VMTAPE Messages and Codes		VMTMSGS		YXOE
VMTAPE User's Guide		VMTUSER		YXOE
VMSECURE				
VMSECURE User's Guide		VMSECURE		YXOE
Waterloo SCRIPT				
Reference Manual	WSCRPTRF	WSCRPTRF		YXLC
User's Guide	WSCRPTUG	WSCRPTUG		YXLC
Using SCRIPT in MVS/TSO	WSCRPTSO	WSCRPTSO		YXLC
Waterloo SCRIPT and a PostScript Printer	WSCRPTPS	WSCRPTPS		YXLC
Formula Processor Summary	WSCRPTFP	WSCRPTFP		YXLC
GML User's Guide	GMLUG	GMLUG		YXLC
GML Reference Summary	GMLRFSUM	GMLRFSUM		YXLC
OBS WYLBUR				
Messages and Codes	WYLMSGS			YXLD
Qwik Files	WYLQWIK			YXLD
Reference Summary	WYLREFCD			YXLG
Reference Manual	WYLREFMN			YXLD
7.0 Release Guide	WYLREL70			YXLC
User Guide	WYLUSER			YXLD
Electronic Mail				
A User's Guide to Electronic MAIL		MAILBOOK		YXOC

In these examples, the document to be printed is the UTCS Guide to Census Tapes (MANUAL/LISTING=CENSUS).
<RETURN> means RETURN or ENTER key.

TSO: document census forms(yxle) <RETURN>

WYLBUR: do document <RETURN> and respond to the prompts.

CMS: document <RETURN> <RETURN>
laser census listing (forms yxle <RETURN>

GP UNIX: nohup ipr -8p -fyxle /usr/doc/utcs/census & <RETURN>

* *Recommended forms code for the 8700 is YXLE unless otherwise stated.*
‡ *Use the 87set command. Type "help 87set".*

Consulting and Enquiries

Applications Support & Advising Supervisor	Alex Nishri	KC308	978-7109
External Marketing Consultant	Ihor Prociuk	KC308	978-6875
Erindale College	Joe Lim	ER2035	828-5311
Scarborough College	William Barek	SC626	284-3173
Information Office	Dale Wright	EA206	978-4990
Account & Access Code Enquiries (U of T)	tba	MP337	978-8703
Account & Access Code Enquiries (External)	Sylvia May	MP337	978-7148
IBM PC Maintenance	Kam Mark	SF4306	978-5050
Tape Library (Academic Services)	Rosa Ciddio	MP368	978-7319
Tape Library (Administrative Services)	Miranda Fong	MP368	978-6693
Terminal Rentals	Louise Hunt	SF4306	978-3787
U of T Computer Library	Stephanie Johnston	EA206	978-2987
UTCS Noncredit Short Courses	Irene Rosiecki	EA207	978-4565

Consulting & Advising Services		300 (bps) Interactive Services	978-6200
Phone:	978-HELP	1200 (bps) Interactive Services	978-3959
CMS, TSO and GP UNIX userids:	ADVISOR	2400 (bps) Interactive Services	978-7239
CMS Userid for mail problems:	POSTMSTR	Datapac	4320 0056
System Status Enquiries (GP UNIX)	978-4318	Telnet	0302043200056
System Status Enquiries (IBM)	978-7393	Tymnet	<backspace>DPAC;302043200056

UTCS Directory

Director	Dr. Warren Jackson	MP350	978-8948	WCJ at UTORONTO *
Associate Director	Eugene Siciunas	MP350	978-5058	EUGENE at UTORONTO *
Managers:				
Communications & Technical Support	Norman Housley	SF4306	978-4967	NORMAN at UTORONTO *
Internal Systems & Administration	Ron Vander Kraats	MP350	978-4428	RVK at UTORONTO *
Operations	Dr. Bob Chambers	MP350	978-7092	
Systems	Bill Lauriston	MP331	978-3579	BILL at UTORONTO *
User Interface	Don Gibson	KC308	978-7331	DON at UTORONTO *

Committees on Computing

Committee on Administrative Computing	Chair	Janice Oliver	978-4322	
Research Board Standing Committee on Computing	Chair	Prof. C.C. Gotlieb	978-2986	
UTCS Board	Chair	Prof. D.M. Nowlan	978-4984	NOWLAN at UTORONTO *
Supercompter Users' Group at U of T	Chair	Prof. P.P. Kronberg	978-4971	

ER = Erindale
KC = Koffler Centre
SF = Sandford Fleming
SC = Scarborough
MP = McLennan Physical Labs

* NetNorth/BITNET/EARN

UTCS Terminal and Advising Sites

Names and Locations

- **Central Advising Office (CAO), 978-HELP**
- **Education Facility (Educ)**, Koffler Centre, 214 College St., Room 308
- **Engineering Annex (EA, CDF)**,11 King's College Road, Rooms 103, 107, 107B, 201, 203
- **Erindale College (Erin), 828-5339**, Mississauga Road, Erindale Campus, Rooms 2005, 2039, 2045
- **Robarts**, Robarts Library, 130 St. George St., Room 1061A
- **Scarborough College (Scar), 284-3122**, Military Trail, Scarborough Campus, Rooms S624, S625, S627, S628, S628A
- **Sidney Smith (Sidney)**, 100 St. George St., Rooms 1071, 1073, 2105
- **St.Michael's College**, 121 St. Joseph St., Room 107
- **Trinity College**, 6 Hoskins Ave., Room 024
- **Victoria University**, 73 Queens Park Cres.

Sites	**Hours of Access**				**Restrictions***	**Advising**
	Mon-Thurs	**Fri**	**Sat**	**Sun**		
CAO	10:00-18:00	10:00-18:00	closed	closed	Research	978-HELP
CDF	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	No
EA	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Educ	9:00-18:00	9:00-18:00	closed	closed	Research**	978-HELP
Erin (2039)☐	9:00-17:00	9:00-17:00	12:00-16:00	closed	Research	Rm 2005
(2045)	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	Rm 2005
(235†)	8:00-22:00	8:00-17:00	closed	closed	None	Rm 2046
Robarts	8:30-23:00	8:30-18:00	9:00-17:00	closed	None	978-HELP for Research
Scar	24hrs°	24hrs°	24hrs°	24hrs°	Research	Rm S626
					Undergrads	Rm S626-A
Sidney	7:00-24:00	7:00-24:00	7:00-24:00	7:00-24:00	None	978-HELP for Research
St.Michael's	closed	closed	closed	closed	None	Arranged by College
Trinity	closed	closed	closed	closed	None	Arranged by College
Victoria	closed	closed	closed	closed	None	Arranged by College

* Research includes graduates, faculty, staff. ** May be unavailable due to UTCS courses. ☐ key access available.
° printers available some of the time. † access restricted to building hours.

Advising Hours

CAO	Monday through Friday, 10:00 - 18:00
Scarborough	Monday through Friday, 09:00 - 16:30, Tuesday 18:00 - 24:00
Erin	Monday through Friday, 09:00 - 20:00

Sites	**PACX**	**Network Terminal Server**	**CMS Terminals**	**Printers**	**CDF/PC**
CDF	Y	N	N	Y	N
EA	N	Y	Y	Y	N
Educ	Y	N	N	N	N
Erin	Y	Y	N	Y	N
Robarts	Y	N	Y	Y	Y
Scar	Y	Y	N	Y	N
Sidney	N	Y	Y	Y	Y
St.Michael's	Y	N	N	Y	Y
Trinity	N	N	Y	Y	Y
Victoria	Y	N	N	Y	Y

(Y=yes, N=no)

UTCS Services

The principle mandate of UTCS is to plan, implement, and operate computer facilities and "common-carrier" networks, and to plan and support divisional, departmental or project computer facilities as requested.

UTCS Centrally Owned and Managed

Systems

IBM MVS

- TSO, WYLBUR, APL, Batch
- runs as a preferred guest under VM
- MVS operating system
- Xerox 8700 Laser Printing

IBM VM/CMS

- General Purpose Timesharing; access to NetNorth, BITNET, and EARN networks; access to Cray X-MP
- 4381-R03 processor, 32 megabytes of memory
- CP operating system, VM/SP HPO R3.4
  CMS timesharing system, VM/SP Release 3
  RSCS spooling system, Release 3
  CRAY station Release 4

GP UNIX

Technical Assistance: 978-8853

- General Purpose Timesharing under SUN UNIX 3.2
- SUN 3/280, 8 megabytes of memory
- access to Linotronic typesetter
- offers a sophisticated and powerful environment for text processing
- offers a sophisticated programming environment suitable for commercial software development or testing
- full access to USENET, an electronic technical information exchange facility
- offers excellent electronic mail facilities and ability to send or receive mail from most computer networks world wide, such as UUCPNET, ARPANET, NetNorth, BITNET, CSNET, CDNNET

Services

Communications & Technical Support

Primary Phones: 978-3787, 978-4967

- Communications Group provides communications systems, terminals, modems, data channels: consulting and installation.
- Field Service Group installs and maintains communications and computer systems, particularly IBM PCs and Micro Vaxes, on a contract basis or on a cost-per-call basis.
- provides consulting on computer systems technology and installs computer systems
- provides access between the IBM systems and machines using UNIX, VMS and other operating systems. Ethernet, Pronet, and IBM TRN technologies are used over various transmission media including optical fibre More basic communications techniques are also used for moderate speed links
- provides consulting on local area networking and installs LANS
- provides access to NetNorth (BITNET), the North American Universities Network; and USENET, the UNIX networking fraternity
- will provide a communications solution to department needs on a contractual basis

User Interface Group

Primary Phone: 978-HELP

- provides advising, consulting and documentation on:
  - command languages including CMS, TSO, WYLBUR, JCL, and UNIX
  - high level languages including FORTRAN, and PL/I
  - packages and libraries including SAS, SPSS-X, BMDP, IMSL, and NAg
  - editors and formatters including XEDIT, TSO, WYLBUR, ed, SCRIBE, nroff/troff
- provides general micro support
  - selection consulting for hardware and software
  - Micro Lab for evaluation of hardware and software
  - advice on University discounts
  - media conversion and data transfer
  - operates UTCS Microcomputer Bulletin Board System
  - offers Micro Laser Printing Service
  - offers 35mm slide production service using Polaroid Palette
  - administers Local Area Network of PCs for research use
- high quality typesetting
- installs and maintains application packages
- provides courses on the more popular services

Facilities Managed by UTCS

Administrative Computing

- administrative IMS/VS, DB/DC, DB2, Batch, and TS0
- 4381-R03 processor, 32 megabytes of memory
- MVS operating system

Computer Disciplines Facility/VAX

VAX-11/780, 4 megabytes of memory
VAX-11/750, 4 megabytes of memory
VAX-11/750, 4 megabytes of memory

- Computer Science interactive access
- UNIX (Berkeley UNIX 4.2BSD)

Computer Disciplines Facility/PC

- 97 TI Professional Computers connected in a Local Area Network
- introductory Computer Science instruction
- MS-DOS with Turing environment

Scarborough College Systems

SUN 3/280, 16 megabytes of memory
SUN 3/280, 16 megabytes of memory

- instructional access using UNIX (Berkeley UNIX 4.2BSD)

Erindale College Systems

VAX 8200, 8 megabytes of memory

- instructional access using VMS
- research access

VAX-11/750, 5 megabytes of memory

- instructional access using UNIX (Berkeley UNIX 4.2BSD)

Institutional Relations System

VAX-11/750, 8 megabytes of memory

- database services to the owner departments using VMS

EPAS Facility

- 4361-5 processor, 16 megabytes of memory
- general VM/CMS services to the owner departments

Centre for Large Scale Computation (CLSC)

- Cray Research Inc. X-MP/22
- 2 processors, 2 megawords main memory
- solid state disk (SSD) with 16 megawords of storage
- COS 1.15 operating system
- VAX-11/750 + microVAX II providing VMS front-end services
- VM front-end services provided by UTCS 4381-P02

Software List

Each programming language or package available at UTCS has a support level. In general, Class A Products receive full support, Class B limited support (as time and resources allow), Class C no active support. For complete details of UTCS product support policy, see the UTCS GUIDE TO PRODUCTS AND SERVICES:Introduction.

MVS SOFTWARE

MVS Package/ Compiler	Support Level	Version
Graphics Packages		
PLOTBASIC (FORTRAN)	A	
PLOTBASIC EXTENDED ROUTINES	A	
SAS/GRAPH	A	82.4; 5.08
SURFACE II	C	
ISPF/PDF	B	1
WYLBUR	A	7.0
Languages		
APL (Sharp)	C	May 83
ALGOLW (Stanford)	C	n/a
ASSEMBLER(F)	C	2.1
A.A.E.C. PASCAL	C	2.0
FORTRAN H EXT.	B	2.2.1
LISP	C	
MARKEXAM	C	
PL/C	C	
PL/I CHECKOUT COMPILER	B	1.3.0
PL/I OPT COMPILER	B	1.4.0; 1.5.0
SNOBOL 4	C	3.5
SPITBOL	C	
UTCS FORTRAN UTILITIES	B	
VS COBOL	C	2.4
VS FORTRAN	A	1.4.1
WATBOL	C	V3L2
WATFIV	B	
WPASCAL	C	(U of Waterloo/ West Valley Joint Community College Version)
Numerical Packages		
DYNAMO	B	4.07
EISPACK	C	4
FORMAC	C	
FUNPACK	C	
GPSS	A	Rel.1, Mod. Level 4
IMSL	A	9.2
LINPACK	C	
MINOS	C	4.0
MINPACK	C	1
MPSX	C	Rel. 1, Mod. Level 6
NAg	A	Mark 11
Statistical Packages		
BMD	C	
BMDP	A	Level 85
GENSTAT	C	4.04B
IMSL	A	9.2
NAg	A	Mark 11
NTSYS	C	Dec. 1982
SAS	A	82.4; 5.08; 5.15
SPSS	C	9.1
SPSS-X	A	2.1,2.2
TSP	C	3.5
Text-Processing Packages		
COGS(Concordance Generating System)	B	3.1
KWIC	C	
OCP (Oxford Concordance Program)	C	1.4
Waterloo SCRIPT	B	85.1
Utilities		
DSMAP	A	
FILEBOL	C	
GRIPE	A	
IBM UTILITIES		
IEBGENER	A	
IEBCOPY	A	
IEHMOVE	A	
DFSORT	A	6.0
TAPEPRT	A	
TAPEXRAY	A	
TCOPY	A	
UTCS FORTRAN UTILITIES	B	

VM/CMS SOFTWARE

VM/CMS Package/ Compiler	Support Level	Version
Communications Packages		
FTS	A	
Kermit	A	
MAIL/MAILBOOK	A	86.359
MICROLASER	A	
Graphics Packages		
SAS/GRAPH	A	82.3; 5.08; 5.16
PLOTBASIC(FORTRAN)	C	
Languages		
ASSEMBLER(F)	C	
Concurrent Euclid	C	1.9
FORTUTILS	A	2.0
PL/I CHECKOUT COMPILER	B	1.3.0
PL/I OPT COMPILER	B	1.4.0; 1.5.1
REXX	A	
SNOBOL 4	C	3.5
Turing	C	
VS FORTRAN	A	1.4.1
VS PASCAL	C	2.1; 2.2
Waterloo C	C	1.2
WATFIV	C	V2L0
WATFOR-77	A	1.3
Numerical Packages		
IMSL	A	9.2
Linpack	C	
Statistical Packages		
BMDP	A	Level 83, Level 85
IMSL	A	9.2
Minitab	B	82.1; 5.1
SAS	A	82.3; 5.16
SPSS-X	A	2.1,2.2
Text-Processing Packages		
SCRIBE	A	4(1400)-1
Waterloo SCRIPT	B	85.1
XEDIT	A	
8700 Pseudotypesetting	A	n/a
MICROLASER	A	
Utilities		
FORTUTILS	A	2.2
TPRINT	C	

Software List continued

UNIX SOFTWARE

UNIX Package/ Compiler	Support Level	Version
Communications Packages		
kermit	B	4C(058)
macget/macput	C	
netcopy, netexec, to (NetNorth Tools)	C	
xmodem	C	
ftp, rsh, rlogin, telnet, rcp (Access via TCP/IP to most of the networked machines on all three campuses)	B	
rn/Pnews	B	
mail, mh, Mail		
rje	B	
Languages		
cc	A	
f77	C	
ratfor	C	BSD std.
ttc	C	
pc	C	BSD std.
yacc	C	
awk	C	
adb,dbx	C	BSD std.
Text-Processing Facilities		
ed	A	
vi	C	
emacs	C	
spell	C	
diction/explain	C	
eqn	A	
tbl	A	
pic	C	
troff	A	
nroff	A	
TeX	C	
Utilities		
crypt	A	BSD std.
compress	C	BSD std.
csh	B	BSD std.
diff	A	BSD std.
grep	A	BSD std.
ipr	B	
learn	C	BSD std.
patch	C	
sed	A	BSD std.
sort	A	BSD std.
sh	A	BSD std.
tar	A	BSD std.
uniq	A	BSD std.

MICROCOMPUTER SOFTWARE

The following are microcomputer software packages for which UTCS can provide either support or some information. As with mainframe products, micro packages receive full support (Class A), limited support (Class B), or no active support (Class C). The specific criteria differ from those for mainframe classes and are outlined in the Academic's Guide to Microcomputer Systems.

Package/ Compiler	Support Level	Version
Communications Packages		
Kermit (MS-DOS)	A	2.27d
Kermit (APPLE II)	A	
Kermit (CP/M)	C	
Kermit Macintosh	B	
PC TALK3	C	
PC PLOT III	A	
ProComm	A	2.42 UT
MacTerminal	B	
WYLBUR/PC	C	
Database Managers		
AskSam	C	2.2
Clipper	B	
DATAEASE	B	
dBASE II (CP/M)	B	
dBASE II (MS-DOS)	C	
dBASE III	A	1.1
dBIIICompiler	B	1.1
FoxBASE	C	2.14u
Notebook II	B	2.03
REFLEX	B	
ViewFinder III	B	
ZyINDEX	B	
Graphics Packages		
DR HALO	C	
Lotus 1-2-3	B	2.01
Microsoft CHART (Macintosh)	C	
MacPaint	B	
WATCOM GKS	B	
35mm Express	B	
Languages		
BASIC	A	
Microsoft FORTRAN	C	
TURBO Pascal	B	
WATFOR-77	A	
Operating Systems, Utilities		
APPLE Turnover	A	
CP/M	B	
FASTBACK	B	
PC-DOS	A	
Sidekick	B	
SuperKey	C	
TURBO Lightning	C	
XenoDisk	A	1.41
Spreadsheet Packages		
APPLEWORKS	C	
Lotus 1-2-3	B	2.01
Multiplan (Macintosh)	C	
Statistical Packages		
MINITAB	C	
PowerStat	C	1.04
SAS/PC	A	6.02
SPSS/PC +	A	
Statpro	C	2.0c
Word-Processing Packages		
Gutenberg Senior	C	
FinalWord II	B	2.0
MacWrite	C	
Microsoft Word (MS-DOS)	B	2.0
Microsoft Word (Macintosh)	A	
Nota Bene	B	
T^3	C	
Volkswriter Scientific	C	
WordPerfect	A	4.1; 4.2
WordStar	B	

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